He attended the 1841 meeting of the Association of American Geologists and Naturalists and read a paper of capital importance upon the slates of Waterville, Maine, in which he discussed the markings upon the slates and indicated their organic origin, which he regarded as proving their great age. He was present also at the third meeting and took a prominent part in the discussion of the 'drift' so that he was appointed member of the committee to prepare a report upon that subject for the next meeting. He was elected secretary of the Association for 1843 and, with Benjamin Silliman, Jr., served in the same office for 1844. His duties at Dartmouth were exacting, so that for many years he published few extended papers, but he made many brief communications to societies, all of which were characterized by keen discrimination and many of them were important contributions.

Doctor Hubbard joined this Academy in 1874 and at once became so active that when Mr. Browne, who had been Recording Secretary from 1839, resigned in 1875, Professor Hubbard was chosen as his successor. He retained this office until 1885, when he became Vice-President. At the death of Doctor Newberry in 1892, he was made President, but he served for only one term, declining re-election because of his advanced years. From 1874 until 1893 he rarely failed to attend the meetings, when in the city, and he always presented something of interest bearing upon matters under consideration. His manner was courteous to the last degree and he understood well how to discuss without disputing.

Professor Hubbard's individuality was very decided; though so gentle and considerate in his manner, he always held positive opinions and, when necessary, did not hesitate to express them. His shrewd common sense made him a good counsel and his advice was sought in many directions. He was a member of the New Hampshire Legislature in 1863–4, but one year's experience in that kind of work sufficed and he declined to be a candidate for re-election. His quiet humor and his store of reminiscences made him a delightful companion. He retained his mental vigor to the last and only two months ago he published an article correcting errors in a recently published work. When ninety years old, he attended the New York meeting of the Geological Society of America and remained throughout an afternoon listening to severely abstract papers, with as much interest, apparently, as though he were just beginning his work.

Professor Hubbard was almost the last link binding our time with that of the early geologists. Hall and Dana died within the last half decade and there remain only Boyé and Lesley of those who attended the earlier meetings of the Association of American Geologists. He passed away in a ripe old age, his life full of good works and his name absolutely unstained. This Academy owes him much, and here his name should be cherished.

J. J. STEVENSON.
ALEX. A. JULIEN.

SCIENTIFIC BOOKS.

The World and the Individual. Gifford Lectures delivered before the University of Aberdeen. First Series; The Four Historical Conceptions of Being. By JOSIAH ROYCE, Ph.D., Professor of the History of Philosophy in Harvard University. New York, The Macmillan Company. 1900. Crown 8vo. Pp. xiv+588.

The purpose of the Gifford Lectures at the four Scottish universities is now understood pretty well even in foreign countries. The Deed of Gift defines it as the "Promoting, Advancing, Teaching and Diffusing the study of Natural Theology, in the widest sense of that term"; and directs the "lecturers to treat their subject as a strictly natural science, without

reference to or reliance upon any supposed special, exceptional or so-called miraculous revelation." "I wish it considered just as astronomy or chemistry is," the Founder writes. In these circumstances, readers of SCIENCE might expect to find many matters of direct interest in the lectures, especially when they recall that courses have been delivered by Sir George Stokes, Sir Michael Foster, and Professor William James, or that Helmholtz and Lord Kelvin were requested to accept election. It so happens, however, that Natural Theology has been more and more transformed from the semblance of its old self by Metaphysic, during the nineteenth century, and some of the lecturers, like the Master of Balliol and Professor Ward of Cambridge University, and now Professor Royce, attach principal importance to this aspect of the inquiry. Thus, although Mr. Royce's 'Supplementary Essay,' on the One, the Many, and the Infinite, cannot but attract mathematicians, especially such as are concerned about the theory of numbers, his book does not appear, otherwise, to contain much matter of direct moment for readers of this JOURNAL. I say 'appear' advisedly; for here, as so often, appearances happen to be deceitful.

Although the whole of Mr. Royce's work is metaphysical, and sometimes very technically metaphysical, there are but two of the ten lectures (i and iv) which possess little direct bearing upon that scientific view of the universe formulated almost entirely since the time of Laplace. Further, lectures iii, v, vi, vii, viii and ix are of vital importance for contemporary conclusions regarding, not what man *can* know, but what he *does* know—must know in the nature of the case. The titles of these discourses are as follows:—the Independent Beings—a Critical Examination of Realism; the Outcome of Mysticism, and the World of Modern Critical Rationalism; Validity and Experience; the Internal and External Meaning of Ideas; the Fourth Conception of Being; Universality and Unity.

Everyone knows that the sciences, not excepting psychology, presuppose a dualistic attitude towards human experience, for the very simple and very defensible reason that this best consorts with the impartiality necessary to obtaining the most accurate results. So long as he confines himself to his observations and experiments, no scientific man doubts that there is a world of real being existing on its own account in entire independence of thought or its processes. Nevertheless, and curiously enough, he also never doubts—for here lies the whole vitality of his quest—that he can obtain valid knowledge of this foreign sphere. Further, and still more curiously, he is perfectly willing to accept the conclusions of others as valid—co-operation being one leading note of contemporary science. In a word, paradox though it be, dualism and the negation of dualism are equally presuppositions of detailed scientific inquiry. Hence originates what Mr. Royce calls realism, the dogma critically examined and conclusively shown to be untenable in his third chapter. But, while this dualistic metaphysic—unconscious albeit—could remain complacent and, but for Berkeley, comparatively undisturbed, throughout the domination of what has been aptly called the astronomical (or molar) view of the universe, more modern researches, particularly in the field of physiology, gave it the lie direct and from the strictly scientific side. Physiological physics set dualism somersaulting. As Helmholtz said: "I hold that to speak of our ideas of things as having any other than a practical value is absolutely meaningless. They can be nothing but symbols, natural signs, which we learn to use for the regulation of our movements and actions. When we have learned to read these symbols aright, we are able with their aid to direct our actions so that they shall have the desired results; that is, that the expected new sensation shall arise." Or, as Huxley put it, even more pointedly: "All that we know about motion is that it is a name for certain changes in the relation of our visual, tactile and muscular sensations. . . . It is as absurd to suppose that muskiness is a quality inherent in one plant as it would be to imagine that pain is a quality inherent in another, because we feel pain when a thorn pricks the finger." Here we discover the root of that Critical Rationalism, so popular with scientific men during the past generation, and now subjected to such merciless exposure in Mr. Royce's fifth and

sixth lectures. The other lectures, already noted as of importance to scientific readers, really deal with the metaphysical conclusions which modern inquiry, broadly viewed as a whole, most fully warrants. They constitute the first attempt in the United States, so far as I know, to supply a reasoned account of first principles from the standpoint—the only reasonable, and therefore the only defensible one as I think—that human experience is a closed circle, and that if it is to be justified at all, justification must proceed from within this circle.

This is not the place to attempt an estimate of Mr. Royce's contribution to 'natural theology' (*i. e.*, philosophy of religion); moreover, it were more just not to anticipate his second series of lectures, in which he promises to apply his principles. I wish, in conclusion, to draw the attention of mathematicians to the importance of the Supplementary Essay. Written in reply to Mr. F. H. Bradley's conclusions, in 'Appearance and Reality,' it is necessarily of a most technical character. But its suggestiveness will repay some effort. It will serve, also, as I believe, to render many more completely conscious of the change that the last fifty years have wrought upon the old ideals of definiteness and accuracy. These, indispensable desiderata as they are, possess certain limitations. Perception of these limitations has led some to reconsider conceptions once deemed fundamental without question. No doubt, as Mr. C. S. Peirce seems to indicate (SCIENCE, No. 272, pp. 430 ff.), Mr. Royce may be mistaken regarding some matters that lie specially within the purview of the mathematical expert. But, all the same, so far as I am capable of judging, no one can fail to be stimulated by his discussion, not merely of Bradley, but also of Cantor and Dedekind. If he were to have formulated no more than a forcible illustration of the intimate connection between mathematical and metaphysical problems, he would have earned our warm congratulations.

It need hardly be added that the book is one with which all workers in Professor Royce's own field will have to reckon.

R. M. WENLEY.

UNIVERSITY OF MICHIGAN.

A Preliminary Report on the Geology of Louisiana. By GILBERT D. HARRIS and A. C. VEATCH. Baton Rouge. 1900. 8vo. Pp. 354. Pl. 62.

This report on the geology of Louisiana is the first annual report of Professor Harris and one of a series of annual State reports bearing on agriculture, geology, and the development of the State, which are issued under the auspices of the State Board of Agriculture, and distributed free on application. It covers the operations for the season of 1899, and in printing, illustration, etc., is very well gotten up, though, as in many State reports, there are rather more than a fair share of typographical errors. There is an excellent index which is a boon to be thankful for, though, curiously enough, there is nowhere any date of publication.

The contents are divided into three sections (I) an historical synopsis of previous geological work done in the State; (II) general geology; and (III) special reports by various authors, in this case including the geology of the salt mines of the Five Islands, reports on clays, on fossil plants and invertebrates and a popular article on fungi injurious to standing timber.

From the well-known energy and acquirements of the geologist in charge, ably assisted by Mr. Veatch, one naturally expects the clearing up of problems which have long puzzled geologists, with other positive additions to geological knowledge. And, since Professor Harris is a paleontologist and stratigrapher, we do not expect to see complicated questions settled off-hand on the physiographic aspect of a few gravel banks. Nor are these anticipations disappointed.

Earlier workers, especially Hilgard, have insisted on the presence of cretaceous rocks in Louisiana, but their distribution has been more or less uncertain and in the absence of skilled paleontological assistance Lower Eocene fossils have been sometimes taken for Cretaceous remains, etc. One important result of the current work has been the establishment of the fact that the upper Cretaceous (Ripley) under its blanket of Tertiary strata, extends, with a general parallelism to the old Eocene shore line, in many folds in a NE–SW direction. A fairly good list of Cretaceous fossils has been secured,